(12) UK Patent Application (19) GB (11) 2 367 105 (13) A

(43) Date of A Publication 27.03.2002

(21) Application No 0023564.8

(22) Date of Filing 26.09.2000

(51) INT CL[7]
B67D 1/07 , B08B 9/02

(52) UK CL (Edition T)
F2N N2A

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EP 0579051 A2
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(68) Field of Search
UK CL (Edition S) B8N NJA , F2N
INT CL[7] B08B 9/02 , B67D 1/07 3/00
Online: WPI, EPODOC, PAJ

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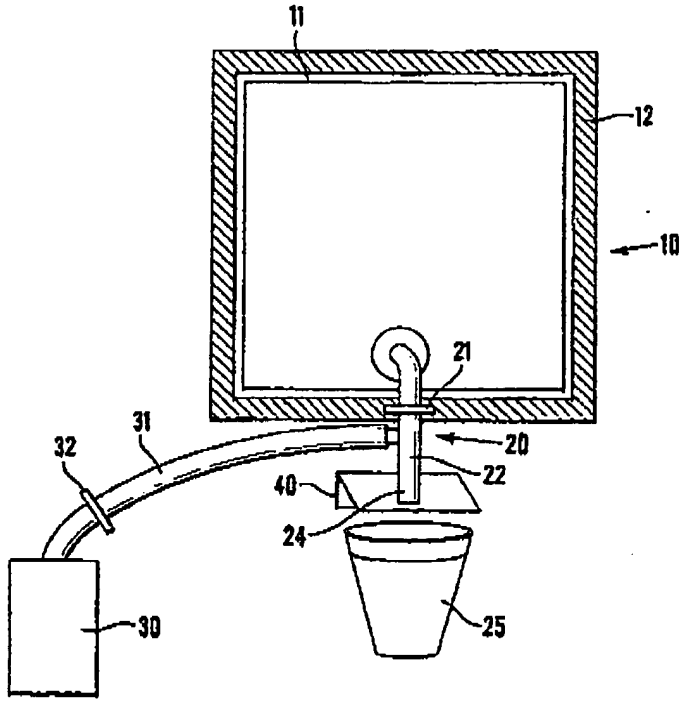
(54) Abstract Title
Cleaning conduits, especially in milk vending machines

(57) The region 22 of an outlet pipe 20 of a milk dispensing machine 10 between a control valve 21 and the spout 24 is intermittently cleaned by opening a second valve 32 to admit hot water and/or steam under pressure by means of a pipe 31 from a tank 30. The machine has a door (not shown) which is locked shut during a cleaning operation. The region 22 may also be subjected to ultra violet radiation from a light box 40.



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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date but within the period prescribed by Rule 25(1) of the Patents Rules 1995.

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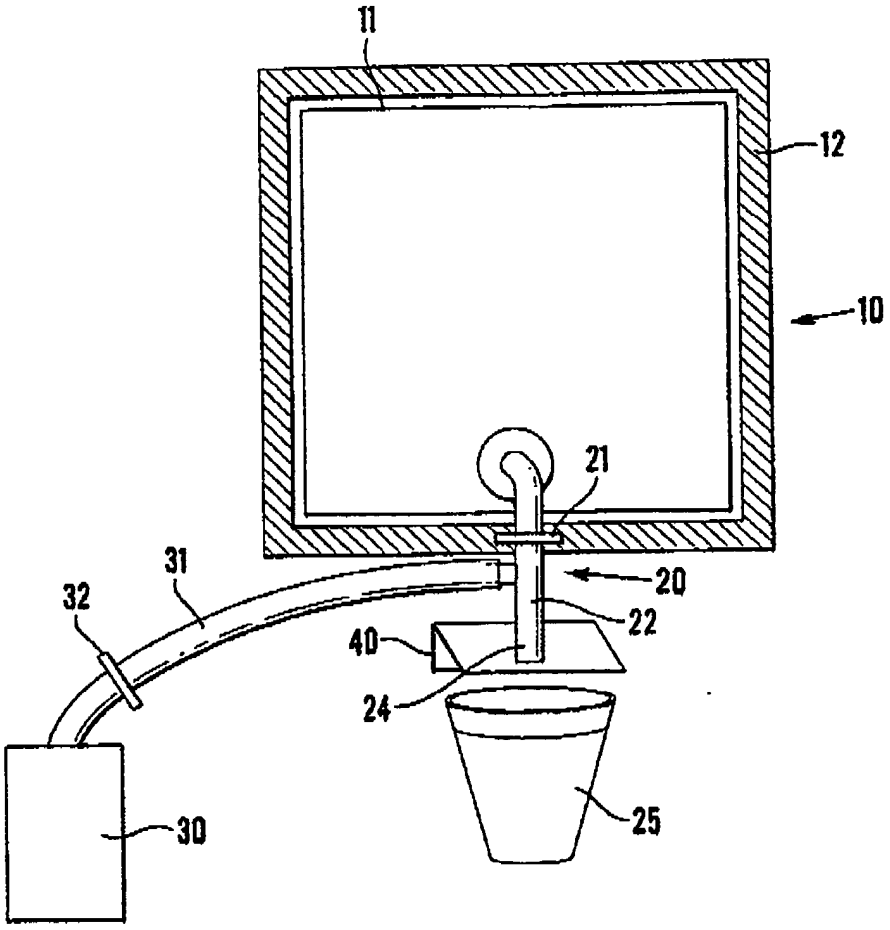

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CLEANING CONDUITS

The present invention relates to an apparatus and method for cleaning conduits and more particularly to sterilising the outlet pipe or tap of a drinks dispenser.

For example, it is known to dispense milk from a so-called bag-in-a-box or pergal arrangement having an outlet pipe with a clamp or valve which can be opened or closed by a press lever. The milk in the box is kept cool, e.g. by being kept in a refrigerated container, but the milk downstream of the clamp is exposed to ambient air and temperature; accordingly milk residues accumulate in this region of the outlet, especially after periods of non-use.

The present invention seeks to overcome or reduce the above problem.

According to a first aspect of the present invention there is provided a liquid dispensing arrangement comprising reservoir means for accommodating a liquid supply, the reservoir means having outlet conduit means with valve means for intermittently dispensing liquid and defining a downstream region of the outlet conduit means between the valve means and the outlet end of the outlet conduit means, and means for intermittently supplying a cleaning fluid and in communication with one end of a second conduit means, the other end of which discharges into said downstream region of the outlet conduit means.

The dispensed liquid is preferably a drink, e.g. milk, and the cleaning fluid is preferably hot water and/or steam.

The arrangement may additionally comprise an ultra violet light source for irradiating said downstream region of the outlet conduit means to remove bacteria.

According to a second aspect of the present invention there is provided a method of cleaning an outlet conduit of a liquid dispensing apparatus incorporating outlet control

means, the method comprising connecting a source of a cleaning fluid to a part of the outlet conduit located downstream of said control means and, at times when liquid is not being dispensed, supplying cleaning fluid to said part of the output channel.

A preferred embodiment of the present invention will now be described, by way of example only, with reference to the accompanying drawing.

A milk dispensing machine 10 comprises a bag of plastics material, typically containing thirteen to twenty three litres of milk contained within a box 11 to form a pergal arrangement. The box is inserted in a refrigerated unit 12. The bag has an integral outlet pipe 20 which passes through corresponding openings in the box 11 and the wall of unit 12.

The flow of milk through pipe 20, for dispensing into a cup 25, is controlled by a clamp or valve 21 which is operated by a press lever which is itself operated remotely by means of an automated mechanism (not shown). As described so far, the arrangement is conventional and between dispensing operations milk residue tends to accumulate in the region 22 of pipe 20 which is between clamp 21 and the spout 24. Over a period of time, and especially after periods of non-use, hygiene problems arise.

The present machine 10 further comprises a tank 30 containing hot water and/or steam connected to the downstream region 22 of pipe 20 by means of a pipe 31, which forms a T-junction with pipe 20. Tank 30 also has a control valve 32 to supply hot water and/or steam under pressure to pipe 31. The machine 10 has a front door (not shown) for enclosing the pipe 20 and in particular its spout 24. Means are provided for detecting closure of the door and an interlock arrangement is provided to prevent hot water or steam being supplied unless the door is shut.

An ultra-violet light box 40 is provided adjacent the pipe 20 to irradiate the region adjacent spout 24. The box is constructed so that the U-V source is not visible to an

operator. Means (not shown) are provided for actuating the light box 40 to expose the spout region to U-V light.

In use, milk is dispensed as required by releasing clamp 21. After a predetermined number of dispensing operations, or after a predetermined volume of milk has been dispensed, or at predetermined times, it is ensured that clamp 21 is in a closed condition. The front door of the machine 10 is then closed and an interlock arrangement is then actuated which allows a cleaning operation to occur. This is effected by opening valve 32 which allows hot water/steam to enter conduit 31 and region 22 to thoroughly clean this region. The interlock arrangement locks the front door of the machine while the cleaning operation is being undertaken, and for a predetermined period of time thereafter to allow the hot water to disperse. This prevents an operator from being scalded.

When the region has satisfactorily cooled down, the interlock arrangement permits the front door to be opened and also permits normal dispensing of milk.

An advantage of the above-described arrangement is that no dismantling of the pipe 20 is necessary, which saves time. Also, the operator is protected from accidental exposure to hot water or steam.

Various modifications may be made to the above-described arrangement. For example, closure of the front door of the machine may assist in preventing the U-V source from being visible to the operator, in which case the light box 40 can only be actuated when the interlock arrangement is in operation. In a further modification actuation of the hot water/steam supply simultaneously and automatically operates the light box 40.

The valve 21 may be operated by any suitable actuating means, including a manually-operated element.

The apparatus may incorporate means for automatically monitoring the number of milk dispensing operations, and/or the volume of milk dispensed and/or the time elapsed since a cleaning operation occurred.

The machine 10 may incorporate pipes for dispensing other products into cup 25, for example coffee powder. The tank 30 and/or the U-V light box 40 may be integrated with refrigerated unit 12 to provide a compact machine 10. However, the U-V light source 40 may be omitted.

The machine 10 may be fully automated. For example, closure of the front door may automatically actuate a cleaning operation.

A fan (not shown) may be provided to accelerate the dispersion of water and heat after a cleaning operation.

The cleaning fluid may include a food-safe chemical.

CLAIMS

1. A liquid dispensing arrangement comprising reservoir means for accommodating a liquid supply, the reservoir means having outlet conduit means with valve means for intermittently dispensing liquid and defining a downstream region of the outlet conduit means between the valve means and the outlet end of the outlet conduit means, and means for intermittently supplying a cleaning fluid and in communication with one end of a second conduit means, the other end of which discharges into said downstream region of the outlet conduit means.

2. An arrangement according to claim 1, wherein the dispensed liquid is a drink.

3. An arrangement according to claim 1 or 2, wherein the cleaning fluid comprises hot water and/or steam.

4. An arrangement according to any preceding claim having a housing with a door and means for preventing cleaning fluid being supplied unless the door is shut.

5. An arrangement according to any preceding claim further comprising an ultra violet light source for irradiating said downstream region of the outlet conduit means.

6. An arrangement according to any preceding claim comprising means for monitoring the number of liquid dispensing operations since the last cleaning operation.

7. An arrangement according to any preceding claim comprising means for monitoring the volume of liquid which has been dispensed since the last cleaning operation.

8. An arrangement according to any preceding claim comprising means for monitoring the time which has elapsed since the last cleaning operation.

9. A method of cleaning an outlet conduit of a liquid dispensing apparatus incorporating outlet control means, the method comprising connecting a source of a cleaning fluid to a part of the outlet conduit located downstream of said control means and, at times when liquid is not being dispensed, supplying cleaning fluid to said part of the output channel.

10. A method according to claim 9 wherein the apparatus further incorporates a door and the method further comprises closing the door and actuating an interlock arrangement to lock the front door shut while cleaning is being undertaken.

11. A method according to claim 10 wherein the front door is also locked shut for a predetermined period of time after cleaning.

12. A method according to any of claims 9 to 11 further comprising irradiating said downstream part of the outlet conduit with an ultra violet light source.

13. A method according to claim 12 wherein the steps of cleaning and irradiating occur simultaneously.

14. A method according to claim 10 or 11 and to claim 12 or 13, wherein the irradiating step can only occur during actuating of the interlock arrangement.

15. A liquid dispensing arrangement substantially as herein described with reference to the accompanying drawing.

16. A method of cleaning a liquid dispensing arrangement substantially as herein described with reference to the accompanying drawing.

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Application No: GB 0023564.8 **Examiner:** John Wilson
Claims searched: 1-16 **Date of search:** 11 April 2001

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): F2N; B8N [NJA]

Int Cl (Ed.7): B08B 9/02; B67D 1/07 3/00

Other: Online:- WPI, EPODOC, PAJ

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X,Y	GB 2142112 A	Mirabile - see fig.2 and description	X: 1-3,9 at least Y: 5,12
Y	GB 1460134	Aluminium Werke - whole document	5,12
X,Y	GB 1328500	Eardley - whole document	X: 1,2,9 at least Y: 5,12
X,Y	EP 0801922 A1	Cicchetti - see figs.1 & 2 and description, esp. col.2 ll.49-54	X: 1-3,9 at least Y: 5,12
X,Y	EP 0579051 A2	Cirio - fig.6 and description, esp. col.5 l.41 to col.6 l.19	X: 1,2,9 at least Y: 5,12
X,Y	WO 00/19875 A1	Bravilor Bonamat - figs. And p 5 l.21 et seq	X: 1-3,9 at least Y: 5,12
X,Y	US 3441034	Burks - whole document	X: 1,2,9 at least Y: 5,12
X,Y	US2645379	Audia - whole document	X: 1,2,9 at least Y: 5,12

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.